Ballistics, Darwinism and Christian Thought. Some Reflections on the Biological Philosophy of Michael Ruse*

Balística, darwinismo y pensamiento cristiano. Algunas reflexiones sobre la filosofía biológica de Michael Ruse

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Abstract

This paper raises an open critical discussion on some key notions in Michael Ruse's philosophy. These include the conceptual elements of scientific explanation, the difference between epistemic and cultural values, the epistemological status of science and religion in explaining nature, the compatibility or incompatibility between Darwinian thought and Christian thought, and especially between evolutionary theory and creationism, the key importance of admitting or not admitting supernatural causality when qualifying an explanation as scientific, the role played by the divinity in the argumentation about the compatibility or incompatibility between science and religion, the convenience of not understanding the Abrahamic god from an ontological perspective but from a psychological one, etc. It ends by proposing certain conclusions that could perhaps contribute to contrast and enrich his philosophy.

Keywords: Michael Ruse - philosophy of science - philosophy of biology - evolutionism-creationism debate

Resumen

El presente artículo plantea una discusión crítica abierta sobre algunas nociones clave en la filosofía de Michael Ruse. Entre ellas, sobre los elementos conceptuales de una explicación científica, la diferencia entre valores epistémicos y culturales, el estatus epistemológico de la ciencia y la religión ante la explicación de la naturaleza, la compatibilidad o incompatibilidad entre el pensamiento darwinista y el pensamiento cristiano y en especial entre la teoría evolucionista y el creacionismo, la importancia clave de admitir o inadmitir la causalidad sobrenatural al calificar una explicación como científica, el papel desempeñado por la divinidad en la argumentación acerca de la compatibilidad o incompatibilidad entre ciencia y religión, la conveniencia de no comprender al dios abrahámico desde una perspectiva ontológica sino psicológica, etc. Finaliza proponiendo ciertas conclusiones que quizás pudieran contribuir a contrastar y enriquecer su filosofía.

Palabras clave: Michael Ruse - filosofía de la ciencia - filosofía de la biología - debate evolucionismo-creacionismo

* Received: 15 de enero de 2023. Accepted: 18 de marzo de 2023.
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Metatheoria 13(2)(2023): 63-77. ISSN 1853-2322. eISSN 1853-2330.

Publicado en la República Argentina.

1. Introduction

The intellectual personality of Michael Ruse (1940-) is, philosophically speaking, too prolific to attempt summarizing his contributions even in a succinct manner within the confines of as few pages as the present. The purpose of this work aspires to much more modest aims: discussing certain issues that a critical reading of his texts would allow us to consider relevant—not merely due to the interest they may garner under our own consideration as authors, which is also relevant, but primarily because of the significance his argumentative controversy has played, both for his own thought and in the academic and non-academic discourse concerning certain current philosophical aspects.

The area of specialization within Ruse's philosophical thought appears to leave little room for doubt. Anyone familiar, even in broad strokes, with his biography will recall how, in addition to decades of teaching at universities in the United States and Canada, Ruse is a member of the Royal Society of Canada, the American Association for the Advancement of Science, and the International Society for Science and Religion. He is also the founder of the specialized journal Biology and Philosophy and holds honorary doctorates from various universities. His role as an expert witness for the American Civil Liberties Union in the 1981 McLean v. Arkansas trial is also well-known. In this trial, he testified as an expert with demonstrated and recognized knowledge in the philosophical areas of science and religion, particularly in the relationship between evolutionism and creationism. His testimony aimed to elucidate the epistemological status of scientific creationism, stating unequivocally his professional opinion on whether scientific creationism is a science: "In my opinion, scientific creationism is not science" (Ruse 2007, p. 5). He then went on, drawing on his expertise in the Philosophy of Religion, to assert that scientific creationism is, in fact, a form of religion.

Finally, the various themes present in numerous titles of his works—such as the conflict between evolution and creation, the compatibility of Darwinism with Christianity, the philosophical issues in the evolution-creation controversy, evolutionary naturalism, and the history, philosophy, and religious implications of the Darwinian paradigm—clearly indicate the focal point of his primary philosophical interests.

Therefore, Ruse's philosophy could be generically considered Philosophy of Science, Philosophy of Biology, and Philosophy of Religion, although not exclusively. While it is true that his philosophical reflections often revolve around these areas of knowledge, specifically addressing the dualities of science-religion and Darwinism-creationism within them, it is equally true that they also encompass a wide range of related yet diverse issues. These include Sociobiology, the Gaia hypothesis, homosexuality, gender bias, scientific research activity, and many others. In any case, in this introduction, we would like to underscore two aspects present in his thought that we consider significant in delineating his philosophical profile.

Firstly, we will present a critical analysis of how his scientific philosophy primarily takes Biology as the principal reference model for science, with much less emphasis on Physics and Chemistry. Therefore, the examination of his work inevitably requires an exploration of certain key concepts in the continuities between scientific and biological philosophy.

Secondly, from a cordial disagreement standpoint, we will discuss some central aspects of Ruse's strong thesis on correlations between science and religion on one hand, and between evolutionism and creationism in their various forms on the other hand. Specifically, we will address the absence of severe or definitive incompatibilities between them, and even, if one wishes, the broad compatibility. This extends to the point of acknowledging the possibility of a well-understood argument in favor of the complementarity of both disciplines in multiple elements related to ideas, values, moral dilemmas, conceptions of nature and society, explanations of the universe and its origin, etc.

2. Epistemic and cultural values

Ruse links the distinction between both types of values and their significance in the Philosophy of Science to the longstanding debate, deeply rooted in the philosophical tradition, between objectivism and subjectivism (2001, pp. 46-51). As may be recalled, philosophers and scientists of the late 19th and early 20th centuries, partly due to adopting a conception of science heavily indebted to the prevailing positivism and neopositivism of their respective eras, were strongly and predominantly committed to the conviction of the strict neutrality of scientific activity concerning all axiology and existential semantics. This entails neutrality towards any value on the one hand and any questioning of the meaning of existence on the other.

This idea casts its long philosophical shadow back to David Hume's "A Treatise of Human Nature" (1711-1776), particularly in Book III, Part 1, Section I, titled "Moral distinctions do not derive from reason" (1988). Hume's postulation of the rigid separation between statements constructed with the copulative verbs 'is' and 'ought' was openly embraced by the vast majority of philosophers. Richard Hare (1919-2002) even elevated this principle to the status of "Hume's law" with his formulation: "No ought from an is" (1967, p. 108).

Thus, returning to the intellectual milieu of the nineteenth century, this idea can be clearly discerned in the works of some illustrious contemporaneous sociologists, such as Herbert Spencer (1820-1903), Émile Durkheim (1858-1917), and especially Max Weber (1864-1920), who explicitly dedicated his famous essay "*Die Bedeutung der 'Wertneutralität' in der Soziologie und Wirtschaftswissenschaft*" (1973) to this matter. According to this belief, science is, or at least if it is to be genuinely excellent science, should be neutral regarding all values in the exercise of its professional activity. It should also refrain from engaging in any more or less philosophical inquiry into the meaning of human existence in its journey through life. The accepted dogma was that genuine science seeks to describe and explain facts, not to make value judgments or inquire into the meaning of life; otherwise, it could be considered Metaphysics—pre-Kantian—but not science. Only by adhering to this principle could we ensure the objectivity of science, understood as an activity that is neutral or devoid of value judgments. This belief, obviously, led the majority of scientists and philosophers of science to consider it more definitively objective, thereby distancing themselves epistemically from subjectivism and any spurious circumstances that could be associated with it, such as emotions, feelings, personal valuations, individual psychological profiles, historical and social contexts, etc. In Ruse's words when presenting the objectivist position, "the best science, professional science, must be free of non-epistemic values; it must be objective" (Ruse 2001, p. 92). To achieve this, the scientific community had to embrace objectivism while vehemently avoiding subjectivism and any reminiscent associations.

Given the considerations indicated in the preceding paragraph, one does not need to be overly astute to appreciate the compatibility between objectivism and realism on one hand, and subjectivism and anti-realism on the other. This alignment leads, respectively, to the philosophy of science inherent in the inherited conception and authors such as Rudolf Carnap (1891-1970), Otto Neurath (1881-1945), and Willard Quine (1908-2000), etc., or to the philosophy of science characteristic of the historical school and authors such as Thomas Kuhn (1922-1996), Imre Lakatos (1922-1974), or Larry Laudan (1941-1922), among others. Thus, the dialectical framework of this debate leads Ruse to adhere to the common distinction among epistemologists when addressing this critical issue, namely, between epistemic values and cultural values.

Epistemic values encompass a set of rules and methods of inference accepted and systematized by the confirmation of their efficacy, enabling the exploration of entities, phenomena, and processes of nature to explain them precisely. "The ultimate value in this case is truth, defined as a genuine knowledge of how the world really is" (Ruse 2001, p. 47). The hypothetical-deductive method, based on the constant use of an induction-deduction-induction cycle aimed at formulating hypotheses and

verifying or refuting them, considered the standard model for describing the scientific method, serves as a good example of combined epistemic values due to its tested efficacy.

Cultural values, on the other hand, are those values that, while not strictly epistemic, decisively influence the production and direction of scientific activity. Although they do not constitute the inner core of science or its distinct content, they directly and inevitably condition scientific activity, becoming a significant factor in the production of professional science. As Ruse indicates, they "shape and justify its content more than [they form] a content of science itself" (2001, p. 164). Thus, the intrinsic connection of such cultural values with science is affirmed, as through them, "the non-epistemic promotes the epistemic" (2001, p. 88). Ruse illustrates this notion of cultural value through the influence of deism—a belief in a God as the architect of nature unconcerned with revelation and worship—in the development of Charles Darwin's (1809-1882) theory on the origin of species through natural selection. Darwin's deistic convictions implied a worldview governed by natural laws, a circumstance that paved "the way for the satisfaction of epistemic values" (Ruse 2001, p. 88). Moreover, in certain aspects, the distinction vividly recalls that formulated by Hans Reichenbach (1851-1953) in "Experience an prediction" (2006) between the context of justification—criteria to be satisfied by new ideas and hypotheses to be accepted into the scientific corpus—and the context of discovery—historical, social, psychological circumstances, etc., occurring during the historical process in which scientists generate new ideas or hypotheses (Bárcenas 2002, p. 48).

We concur with Ruse's analysis on this matter primarily in two aspects: first, in problematizing the complete imperviousness of the epistemic-cultural values distinction, and second, in not establishing from it a simplistic or reductionist and immediate association with the mainstream positions of objectivism-subjectivism in philosophy of science. Despite the objectivist's apparent attempt to eliminate the presence of cultural values in professional scientific activity, it becomes impossible to implement it without recognizing its immanence. However, for the subjectivist conception, it is also challenging to deny, even admitting as a premise the partly or wholly cultural nature of epistemic values, that there are certain systematically coincident rules and methods of inference that show a demonstrated efficacy in developing scientific activity in specific historical and cultural contexts.

Thus, the posed question is much more complex and would not be resolved simply by assuming the dichotomy between epistemic and cultural values without further consideration. The crux of this discussion lies in determining "whether scientific values really pursue truth or are not what they claim to be" (Ruse 2001, p. 47). This is where the dilemma is situated. For the objectivist, truth essentially consists of a discovery, a kind of knowable property existing in nature that can necessarily be inferred from it, and therefore, they align with the perspective of realism. In contrast, for the subjectivist, truth primarily lies in a construction, the result of human intellectual activity developed in the context of specific historical, cultural, psychological, etc., circumstances. Hence, they consider their approach reconciled with the perspective of anti-realism.

In philosophy of biology, this realism-anti-realism debate has been thoroughly and incisively studied by Antonio Diéguez (2005), to whose investigation we refer as it exceeds the direct limits of the purpose of this article. But returning to the dichotomy between cultural and epistemic values, if, in addition to the aforementioned, it is considered that everything epistemic is inevitably cultural in a certain sense, and that much of what is cultural inevitably proceeds from the epistemic, then this debate between the two doctrines does not seem to be resolved but rather become more complicated.

For these reasons, our preferences in this regard lean towards distinguishing between intra-epistemic values—those observable in the production of science as a transcendent constant beyond any historical-cultural or other context—and extra-epistemic values—those different from the former that nevertheless impact the generation of the results of scientific activity.

3. About those traits that really characterise the authentic science

However, being honest, are we in an adequate position to elucidate what would be the intra-epistemic values—epistemic within the Rusean conceptual framework—and what would each one consists of? It is well-known that philosophers and historians of science have extensively debated this issue over the last fifty years. When establishing the discussion at this point, Ruse (2001, p. 48) essentially follows the approach due to the foundational and insightful contribution of Ernan McMullin (1982), who, in acknowledging the presence of excellent science or a good scientific theory, refers to predictive precision, internal coherence, external consistency, unifying power, fertility, and simplicity or elegance. Predictive precision, one of the intra-epistemic values typically placed at the highest positions in various rankings, would essentially involve the ability of a scientific theory to formulate hypotheses capable of accurately predicting consequences in an unknown or simply future realm of nature. Other authors, however, speak of predictive success, within a debate that ultimately distinguishes between strong and weak predictivism. For the strong predictivist, successful prediction is distinguished from an ad hoc hypothesis, a fallacious petitio principi strategy, or a self-validated prophecy by having greater confirmatory strength than a deliberately fitting explanation. Thus, predictive success guarantees that the explanatory premises used cannot be qualified as ad hoc and inherently contains more confirmatory value than mere accommodation of the theory to observations. For the weak predictivist, if predictive success is genuinely novel—confirmatory evidence for a particular hypothesis is novel if and only if it is discovered after constructing it, and otherwise, it would be ad hoc—it could never be considered an a priori accommodated hypothesis or a cryptic begging of the question. However, the weak predictivist does not attribute importance to novel predictive success in itself but rather as an intra-epistemic indicator of some other property associated with scientific theories capable of increasing their probability of correctness.

Thus, for example, Maher (1988) argues that novel success is indicated by the possession of a reliable method for generating accurate theories and predictions; Kahn, Landsberg, and Stockman (1992), after reminding us that the literature on novel confirmation mostly ultimately depends on Bayesian analysis of conditional probabilities, argue the impossibility of this philosophical question without an explicit model of the process by which hypotheses are generated. In contrast, Sober and Hitchcock (2004) assert that a theory is genuinely predictive due to its novel success and not merely an ad hoc hypothesis if it does not incur overfitting—excessive adjustment to previously known and indicated data before formulating hypotheses.

Disregarding a deeper delve into this debate, both because it exceeds the direct material scope of this text and to avoid steering it into the realms of scholasticism or eristic, in our opinion, successful and precise predictability can indeed be considered a magnificent candidate for an undeniable intra-epistemic value. Historical experience has shown that any theory incapable of predicting or only capable of predicting inaccurately ultimately becomes relegated from science to the history of science—i.e. dismissed—thanks to the scrutiny it faces from the scientific community, revealing its uselessness. Given this premise, we understand that at least three consequences can be inferred.

First, although for Ruse (2001, p. 49), Karl Popper's (1902-1994) falsifiability, not included in McMullin's catalogue or similar ones, would be implied by exact prediction or at least closely related to it and thus with internal coherence and external consistency, in our view, the intra-epistemic value of exact and precise prediction derived from a scientific theory lies more in the possibility of being falsified. This is the conditio sine qua non to prove that it is susceptible to verification. We believe this nuance makes sense given the dynamics of the knowledge market, where demand—entities funding scientific contributions, so to speak, buying ideas—imperatively requires that any commodity linked to the supply—theories developed by those aiming to make a successful scientific contribution and therefore, selling ideas—contains a sufficient ratio of predictive value. Failure to do so risks labelling it

as unsellable: a classification translated into a strong suspicion of academic unseriousness or falsehood. Thus, suppliers seek to verify their own positions while being attacked by competitors who would like to see them falsified, both intentions being two sides of the same coin, embattled fighters in the same epistemological ring.

Secondly, legitimate science must contain a minimum quantum of realism or objectivism, as a powerfully predictive theory allows us to affirm that it is not solely the vain product of the human imagination but rather "a reflection of something that exists 'out there'" (Ruse 2001, p. 48). This minimum quantum of realism would allow us to interpret this "reflection", beyond Ruse, both as a mirror of nature or as a kind of cognitive map or compass that, purportedly subject to deformation according to previously established parameters, allows us to interact successfully with a certain realm of the natural world in our human-made scientific environments. After all, the primary purpose of a map is not to constitute an exact specular reflection of reality but rather a navigational tool for moving through it. It is reasonable for it to reflect reality only to the extent that it facilitates the success of interaction, and therefore its efficacy is not compromised if it projects the real only to a certain degree of accuracy. Analogously, just as Homo sapiens sapiens adaptively interacts with environments from which, through sensory organs and neural activity, it generates images that can only be considered a mirror of external reality up to a certain point, these images are sufficient as long as they favour successful predictive inferences that optimize fitness from the viewpoint of evolution. This is evident, for example, with colours, which are an organism's interpretation of wavelengths reaching the eyes, and therefore the chromatic range, the quantity or variety of colours with which nature is perceived, depends to a large extent on the species to which the organism belongs and even, at times, on how closely the physiology of that organism coincides with the prototype of its species – see, for example, the instances of achromatopsia in humans. Obviously, the map of science serves different purposes than the perceptual map used by the average sapiens in daily life and, of course, neither one nor the other can be reduced to a set of mere conveniences. Nonetheless, in our opinion, the critical issue in this context is that, based on Ruse's biological philosophy, something of reality must assist us, no matter whether we see scientific products as specular devices or "maps".

Thirdly, and finally, given that truth is the crucial intra-epistemic value for science, successful predictive precision would be one of the graces of the truth sought by science. The reliable charm of that which is certain.

Ruse classifies internal coherence and external consistency as twins. In our minimally dissenting opinion, they would rather be more like fraternal twins: that is, not necessarily stemming from the same egg or logical matrix, but it suffices that they respond to sets of rules and methods of inference demonstrably effective in scientific activity which, although different, are compatible. A theory is internally coherent, it is often said, when it harbours no contradiction, that is, when none of its explicitly constitutive or deducible statements contradicts any other. Two theories would be consistent, at least in the sense of David Hilbert's (1869-1943) second problem and its—according to the predominant opinion in the mathematical community—negative response provided by Kurt Gödel's (1906-1978) first incompleteness theorem, when they are not contradictory to each other. Thus, in Euclidean geometry, the sum of the angles of a triangle is equal to 180 degrees; but not in absolute geometries, also called non-Euclidean because they do not satisfy Euclid's (ca. 325 BC-ca. 265 BC) fifth postulate about parallel lines, since in hyperbolic geometry, it is less than 180º and in elliptic geometry, larger. Therefore, considered as formal systems, Euclidean, hyperbolic, and elliptic geometries would each be internally coherent, but, in the Rusean sense of epistemic and intra-epistemic value in ours, they would be inconsistent with each other. However, no one in their right mind, we understand that not even arguing from the most fanatical interpretation of the Popperian falsifiability criterion, would dare to deny the scientific nature of any of them. And that is because they proceed like twins from different eggs, from a different logical matrix or universe of discourse of rules and methods of

inference since the absolute ones do not observe Euclidean's fifth postulate. Something similar happens, in another example that once again vexes the seemingly limitless logical power of Popperian falsificationism, with Albert Einstein's (1879-1955) general theory of relativity and quantum mechanics: both theories are strongly consistent ad interim, but if both are compared ad extra regarding the universal gravitation formulated by Isaac Newton (1642-1727), then they would be—at least in the majority opinion of the physics community—inconsistent.

As for unifying power, it could be considered as the ability of a theory to integrate coherently previously disparate areas of the same field of knowledge and even several different ones. Ruse does not explicitly define it; rather, he illustrates it through an example cited by McMullin (1982), namely the theory of plate tectonics or global tectonics in geology, as it managed to coalesce previously unrelated geological domains under the same explanatory structure. In our opinion, this notion of unifying power understood as an intra-epistemic value is clearly in harmony with characteristic ideas from the philosophical-methodological framework of William Whewell (1794-1866), a similarity acknowledged and studied by Ruse himself (1975). Among these, in particular, is vera causa or true cause, in the sense of "a cause capable of explaining various phenomena, even if they are different and distant" (Rey 2018, p. 329); the colligation of facts or the mental act by which the investigator unites observed facts and combines them into a new one, according to Whewell's own terminology (1858, pp. 59-69); and, last but not least, the consilience of inductions or convergence of inductions, established in the methodological-scientific phase of hypothesis confirmation when an induction derived from the factual colligation of one class of facts converges with those corresponding to another distinct class (Whewell 1858, pp. 88-90). As Ruse himself notes (1975), in the 1859 edition of "On the Origin of Species," curiously, Darwin begins the text with literal quotes from works whose authorship comes from two staunch supporters of induction, such as "Of the Proficience and Advancement of Learning, Divine and Human" (1605) by Francis Bacon (1561-1626) and "Astronomy and General Physics considered with reference to Natural Theology," volume III of the eight treatises that the Reverend Francis Henry, Earl of Bridgewater, commissioned the Royal Society of London to prepare and ended up being written by Whewell himself.

Regarding fertility, Ruse (2001, p. 49) simply refers to a quote from McMullin (1982) to elaborate on its meaning as an intra-epistemic value, characterizing it basically by two characteristics of the theory: for making novel predictions not included in the explanandum and for generating associations of ideas that solve anomalies and allow for new theoretical extensions, analogous to metaphors in literature. The first of these, it seems obvious, implicitly refers to the deductive-nomological model of Carl Hempel (1905-1997) and Paul Oppenheim (1885-1977) proposed to analyse the underlying causal logic of scientific explanation (1948), by virtue of which the explanandum would describe the entity, phenomenon, or process to be explained —why does X happen?— and the explanans would constitute its explanation —it happens because A—; and the second, also evidently, refers to the notion of anomaly enunciated by Kuhn (2013), i.e. the mismatch or contravention between the expectation produced by the deducible consequences of a theory —if hypothesis A is true, A1 will occur— and nature's response —B1 occurs—, and whose systematic and unresolved accumulation ultimately leads to the need to promote a paradigm shift between normal or stable science and revolutionary science. Thus, we would be dealing with fertility if the theory has novel predictive success, in the sense of novelty explained above, and also a considerable capacity for self-propagation by resolving apparent contraventions between its corollaries and nature through the relationships and correlations susceptible to inference in its conceptual fabric. Despite the above, we simply draw attention to the importance played by predictability in the Hempel-Oppenheim model, to the point of openly stating that "an explanation is not altogether adequate unless its explanans, if taken in time, could have served as a basis for predicting the phenomenon under consideration" (Hempel & Oppenheim 1948, p. 138). In short, while neither Ruse nor McMullin explicitly mention it, the fertility of a theory and its greater or lesser

capacity for novel predictive success would bear a directly proportional relationship as intra-epistemic values.

Lastly, simplicity or elegance is included by McMullin among intra-epistemic values, although it is fair to say that this is reluctantly done, perhaps because these values presumably manifest subjectivist connotations—the bane of neopositivists and objectivists—that would bring it closer to Psychology and Aesthetics while distancing it from Logic, and thus it would acquire an excessive extra-epistemic coloration to be considered reliable. Ruse merely recalls that, for these reasons, objectivist analyses tend to minimize the importance of simplicity or elegance, or argue to transubstantiate it into some other intra-epistemic value (2001, p. 49), as in the cases of Popper or Whewell, who in his opinion attempt to express them respectively in terms of falsifiability and the convergence of inductions. On the other hand, in our view, elegance and especially simplicity, understood as intra-epistemic values, have a clear precedent in William of Ockham's (circa 1285 - circa 1347) Epistemology, whose principle of economy, law of parsimony, or razor—Entia non sunt multiplicanda praeter necessitatem—adequately expresses why a simple and elegant scientific theory, even with equal predictive and explanatory performance, is preferable to another abstruse and cumbersome.

It would only remain for us to confess our longing for an intra-epistemic value not analysed by Ruse based on McMullin's foundational contribution, namely, causal explanatory power which, in our opinion, should be included among the usual axiological-epistemological inventories. Explanation in the sense of a brief and causal description in the sense of causally articulating the proposed explanandum. That is, to explain "in a simplified way, the causal mechanisms that produce the phenomenon and the interaction of its components" (Diéguez 2013, p. 48). It can be admitted that mythos also explains, but not with the same epistemological status as logos: Genesis and creationism are highly explanatory, but without the causal characterization proper to "On the Origin of Species" and the evolutionary theory. We also understand that causal explanatory power would not be simply subsumed under the intra-epistemic value of successful novel predictive precision because a scientific theory can be intensely predictive but at the same time scarcely explanatory, and vice versa. Thus, Newton's law of universal gravitation implies a potentially infinite predictive success, but it only explains one phenomenon: the attraction between bodies with mass. In contrast, Darwin's theory of evolution by natural selection is rather weak when it comes to predicting, not to say outright that it predicts nothing and does not pretend to, but its explanatory power of biological phenomena and processes from the causality played by evolutionary forces—natural selection, mutation, genetic drift, migration, and panmixia—can be fairly considered virtually limitless.

4. Science and religion, religion and science

Michael Ruse's epistemological perspective on the relationships between science and religion, particularly regarding their compatibility or incompatibility, is deliberately ambiguous and somewhat paradoxical in our opinion.

On the one hand, his membership in the International Society for Science and Religion is well-known; on the other hand, public statements can easily be found on the internet where he declares himself an atheist, especially when referring to his embarrassment at being one after reading "The God Delusion" (2013) by Richard Dawkins (1941-). Paradoxically, this confession of atheism contradicts the conscious or unconscious assumption of numerous ideas characteristic of the conceptual framework of Christian thought, such as life after death, the existence of supernatural realms to which the perennial soul travels post-mortem once separated from its corruptible body, or the retributive connection between the non-sinful conduct of a person in life and the reward of access to a supernatural space of goodness where one can eternally enjoy contemplating the glory of a divinity: "Beethoven may have gone to heaven (I'm sure Mozart returned to it, simply), but it would have been because of his

relationships with his fellow human beings and not directly because of his music" (Ruse 1987, p. 117). This is not to mention the systematic and, as we understand it, deliberately calculated ambiguity of Ruse when exposing Christian beliefs, either by presenting them in the voice of a Christian or by maintaining or appearing to maintain the narrative in the first person, as in the following paragraph concerning the strong anthropic principle:

> Although the Christian might agree that we human beings are animals, we are not just an old class of animal. We are animals of a very special type. We are the centre of God's love. We are the beings for whom He suffered on the Cross. All this means that for Christians, we human beings are not contingent beings. The universe does not exist by chance, nor do we exist in the universe by chance. We are the centre and purpose of creation. God cares for us, and within the Christian scheme, it would be unthinkable for human beings not to exist (Ruse 2007, p. 98).

To say the least, it is difficult to affirm whether in the text the author is speaking with the voice of a Christian or with his own voice; this hesitation would not exist completely without the counterpoint of the phrase "for Christians." In conclusion, even though we respectfully acknowledge that anyone can go through various phases of conviction as a believer, agnostic, etc., it can be confidently asserted that his main thesis is to defend the possibility and convenience of a philosophical reflection that reconciles evolutionary theory and Christianity. The complexity of the ingredients to be considered to clarify Ruse's thinking on the relationships between science and religion is further complicated when examining his works, as, as has just been exemplified, the treatment of the issue in them is notably ambiguous, beyond his statements and even accentuated when contrasted with them.

In principle, Ruse (2007, p. 12) seems to admit the compatibility between science and religion based on the argument of the so-called non-overlapping magisteria formulated by Stephen Gould (1941-2002). According to this argument, compatibility between both, if understood appropriately, would result from "the lack of overlap between their respective domains of professional expertise; science, in the empirical constitution of the universe, and religion in the search for appropriate ethical values and the spiritual meaning of our lives" (1997, p. 18). This argument would later be developed more extensively by Gould himself in "Science vs. Religion: A False Conflict" (2000), in which both magisteria would be independent but equivalent. Independent, firstly, because their themes would be different: science aims to understand and explain nature, while religion seeks to offer meaning to human existence based on principles prescribed by a supernatural being. Consequently, one could argue that statements of ontological content belong to scientific activity, while statements of moral and existential content belong to religion. Secondly, their methodology is also different, since science employs the hypothetical-deductive method based on logical and empirical evidence, while religion acts through customary tradition and sacred literature. They are considered equivalent because they share the same hierarchy to contribute to the development of a fulfilling human life. From this, Gould concludes that a fulfilling life requires humans to integrate both magisteria into their judgment. Therefore, Gould's approach advocates for compatibility between science and religion, always within the framework of the described coordinates. In general, Ruse agrees with this argument of Gould's non-overlapping magisteria but, in our opinion, he defends a more permeable or open type of compatibility between science and religion. While Gould maintains that contradictions between scientific and religious explanations must always be resolved in favour of science, relegating religion to the marginal realm of the extra-scientific—at most, to the condition of an extra-epistemic value—Ruse considers that the possibility of the believer reinterpreting their beliefs in light of advances and developments provided by scientific knowledge should be considered plausible in any case. Thus, in the face of an eventual blatant contradiction, to preserve compatibility according to Gould, religion would have to submit to science, whereas for Ruse, it would have to adapt, allowing the believer to embrace scientific knowledge and adjust their beliefs about moral values and the spiritual meaning of existence accordingly.

While accepting the reasonable sufficiency of both theses, in our view, the compatibility between science and religion entails some form of definitive, inexorable, and insurmountable limitation related to the admission or rejection of supernatural causality to explain entities, phenomena, and processes observable in nature. Consequently, the thesis of the inexhaustible adaptability of religious beliefs to incompatible scientific knowledge, as maintained by Ruse, ultimately depends on the infinity of properties attributed to the characteristic concept of "God" in monotheistic religions. The incompatibility is overcome by systematically arguing from divine omnipotence. In Argumentation Theory, this rhetorical recourse could well be labelled as the fallacy of the argumentum ad divinitatem.

However, there would still be some line of reasoning to save the Abrahamic God inherent in the three major monotheistic religions in a world dominated by explanatory and predictive models where it seems that such a God has no place. This could consist, for example, in considering the idea of "God" as an inevitable phenomenological manifestation of human thought. Empirically traceable in all known historical and cultural contexts, the notion of the divine eventually emerges in some of its members. In summary, the Abrahamic God, and specifically the Christian God in Ruse's case, could be saved by psychologising it. Under this consideration, the role of providing moral material, ethical tension, and transcendent meaning of existence would still fall on the side of religion, but understood more as literature than as divine-cosmic revelation. In other words, we generate narratives, tales, and stories that serve as conceptual scaffolding to induce and support the genesis of our customs and ultimately our ethics. Additionally, these narratives satisfy our sense of transcendence and quench our thirst for finding meaning in life—emotional or spiritual requirements in a world the scientific interpretation of which does not provide transcendent, cosmic-level satisfaction.

It should be noted that, given his idea of adaptation, Ruse probably would not find comfort in such a way of understanding the role of divinity. Even less in this world that, dominated by an ideology of science and technology (Habermas, 1989), progressively diminishes any space for the numinous, as we will develop in the following paragraphs.

5. The god of Christian philosophers of biology

For example, and going far beyond a mere psychological-literary recourse to divinity as recently proposed, Ruse neither attempts to refute nor deems unscientific the possibility of admitting the directionality or preconfigured design by the Christian God in the action of phenomena and processes studied at spatial scales typical of quantum mechanics, as suggested in recent decades by authors such as the Biochemistry PhD Arthur Peacocke (1924-2006) or the PhDs in Physics and graduates in Theology Ian Barbour (2023-2013) and John Polkinghorne (1930-2021), among others. It's worth noting that Peacocke was a priest of the Church of England and the founder of the Society of Ordained Scientists, Barbour was awarded the substantial Templeton Prize for the Advancement of Religion in 1999, and Polkinghorne was an ordained Anglican priest, in addition to directing the Society for Science and Religion.

The recently presented argument by Gould on the two non-overlapping magisteria can be considered a development of the articulated discourse to elucidate the relationships between science and religion by Barbour (2004). Barbour has proposed a methodology for classifying the ways in which science and religion relate: antagonism, independence, dialogue, and integration (Monserrat 2004, p. 36). His main thesis is that of independence: the domains of science and religion are distinct and sealed but complementary. Science observes and investigates how entities in the world operate based on objective and public data, while religion deals with the meaning of personal life based on values. Therefore, they do not collide, although they also do not interact by mutually reinforcing, as each respond to its own methods and language. In our view, this independence has its limitations when it comes to explaining the entities and processes comprising the universe, as in such cases, it is possible to

determine whether explanatory statements are true or false. Therefore, Aristotle's golden mean (384 BCE - 322 BCE), opted for by Barbour and Ruse in this context, may be acceptable regarding moral virtues in Ethics or Religion, where doxa is plausible, especially if it is authoritative. However, this approach may not be suitable when episteme primacy is required, as in the case of Ontology or science.

This proposal of independence with complementarity between science and religion, suggested by Barbour and its Gouldian variety of the nonoverlapping magisteria argument, finds development in the field of quantum mechanics, as indicated, thanks to the contribution of authors such as Polkinghorne (1989) or Robert Russell (1927-2007), who was also a PhD in Physics, founder and director of the Centre for Theology and the Natural Sciences, and a priest of the United Church of Christ. The main thesis of these authors basically affirms that the design of God as the creator of the universe is somehow inherent in atomic and subatomic level phenomena. They argue that quantum indeterminacy leaves open a space for God to act directly (Ruse 2007, p. 103). Once this breach is opened, allowing divinity to sneak into the physics of elementary particles, the argument is extrapolated without much difficulty to Chemistry and Biology. The discourse is articulated to argue that quantum processes and effects are ultimately responsible for operational mutations in the dynamics of biological evolution. However, these effects are not evident except at biological timescales precisely because they are averaged by the random changes characteristic of quantum indeterminacy. If an adaptive or evolutionarily favourable mutation is indispensable for the emergence of Homo sapiens, for example, and this requires a biochemical modification at a specific moment in time, quantum mechanics would suggest that we will witness a series of favourable and an equivalent series of unfavourable variations. Still, it is impossible to predict which ones would be favourable or unfavourable at that specific moment. But, according to the approach of authors like Barbour, Polkinghorne, or Russell, there is no problem because the divine being can induce change at will at the right moment, even though the discretion of the deity leads to causing the change that involves the adaptive mutation, blending it among the other favourable and unfavourable variations characteristic of quantum indeterminacy. Thus, without contravening known physical laws or resorting to ad hoc hypotheses or supernatural mechanisms, the design of God and His directive intervention in the creation of the universe, life, or human beings are nevertheless saved. Consequently, the faithful can enjoy their ideological comfort zone with the belief in the dogma that the divinity to which they profess their faith created the world ex nihilo and ex abrupto, albeit allowing life to evolve.

However, we insist that, in our opinion, this discourse continues to fall into a fallacy of appealing to divinity, even though it is adorned with the rhetoric and props typical of elementary particle physics. It attempts, if we may take a poetic-scientific license, to tune into the same wave function. While it is true that the perspectives of authors like Polkinghorne or Russell do not contradict current knowledge in the field of physics, it is even more true that the available scientific knowledge has, for many decades, opened rational and consistent paths based on abundant empirical and theoretical evidence. These paths allow the explanation of mutagenesis without the need to resort to a supernatural intermediary entity, which, from an epistemological point of view, is redundant. The long shadow of the god of the gaps casts its chameleonic influence. In this case, gaps in scientific knowledge are not explicitly wielded as evidence of the existence of divinity. Instead, appeal is made to statistical or probabilistic indeterminacy to argue ad ignorantiam and suggest divine intervention. This is because, given Werner Heisenberg's principle of indeterminacy, it is impossible to prove the non-intervention of divinity in the origin of the universe, life, and human beings, at least with the available scientific knowledge. Consequently, we would be merely facing a variety of the fallacy of appealing to divinity, where the argument ultimately rests on the presupposition of the omnipotence of a supernatural entity. This entity possesses an infinite set of attributes allegedly attributed to an all-powerful deity whose will governs nature to the extent, for example, of determining quantum indeterminacy in favour of favourable or adaptive mutations, thus ensuring life and its evolution. Following the characteristic

taste of scholastic philosophical tradition, this could be aptly named the fallacy of argumentum ad quanticum divinitatem.

Finally, we also disagree with Ruse's treatment of the issue of evil, understood basically as unmotivated physiological or psychological suffering and also as moral reproach. In a theocratic society, for instance, evil with a reason aligns perfectly with the reward-punishment mechanism from which the discourse of the three major monotheistic religions usually presents the relationship between the deity and its followers. The reasoning would be: "God has punished you because you went against his will"; now you suffer because you sinned. However, when it comes to unmotivated suffering, that is, experienced by the agent without a previous cause attributable to sin or violation of divine will, the question becomes complicated. The philosophical question arises, "If I have not violated your will, Lord, why am I punished with this evil?" This question identifies the conflict in the creed of the fervent believer. This complication is well-known, with cases of faith crises experienced by illustrious believers due to unmotivated suffering in their own person or in the lives of family members, relatives, or loved ones. This happened with Friedrich Nietzsche, whose father's intense pain from a degenerative disease that caused blindness and ended in agonizing death led him to lose faith in a God so ungrateful as to allow such torment to a Protestant pastor known for his virtue and kindness. As a result, Nietzsche abandoned his theology studies to embrace philosophy as a form of salvation. Similarly, it happened with the father of evolutionary theory, whose progressive loss of faith in Christian religiosity culminated in definitive disbelief after the death of his eldest daughter Anne Darwin, who died at the age of ten from scarlet fever and a prolonged fever, likely caused by tuberculosis.

Ruse aims to observe a comparable treatment of suffering and evil in general in Darwinism and Christianity, a perspective that, in our opinion and with all due respect, exists only in his imagination. To present the neo-orthodox Christian position, he cites the central thesis of theologian and philosopher of religion John Hick, according to whom motivated or unmotivated suffering exists as a means for the moral and spiritual development of human beings. By allowing it, God activates the development of the human soul towards maturity and, with it, its spiritual growth and perfection. In contrast, Ruse attempts to explore how this relates to Darwinism, stating that "my impression is that they fit very well together." According to Ruse, Darwinism, in line with Dawkins, points out the evil in nature, just as Christianity considers pain not as a random accident but as an ingredient of life that contributes to the spiritual development of human beings.

We disagree. Perhaps unmotivated suffering, and by extension, evil in general, is a common concern among Christian thinkers, but it is by no means of the same importance among scientists and philosophers involved in the development of evolutionary theory. Darwinism demonstrates the existence of evil or pain in nature through the suppressive or restrictive action on life produced by the negative action of natural selection exerted upon lethal or deleterious mutations. It also hinders the survival and reproduction of the organism or species not benefited by favourable or adaptive mutations. However, that's as far as it goes. In no case does Darwinism attribute the central importance of dogma or axiom that Christian thought gives to pain and to the suffering divinity in its crucified filial hypostasis to bear the burden of the salvation of humanity by sifting sin from its timid soul, to the effect that "God feels physical and psychological pain, taken to limits that none of us can feel." Furthermore, what could be considered a key variety of evil that occupies and concerns the thoughts of Christian thinkers, unmotivated evil in the sense just explained, cannot even be considered to exist in the conceptual framework of Darwinism. This is because the failure in the struggle for survival resulting from inadaptability and the consequent exclusion from biological evolution always has an unequivocal ultimate cause: natural selection. For these reasons, we believe that Ruse's position on this matter incurs a clear voluntaristic bias when advocating for an equivalent treatment of the origin of evil and its explanation between Darwinism and Christianity.

6. Conclusions. Agreements and disagreements

At its core, one could say, Rusean philosophy aims primarily to argue and demonstrate the high compatibility between science and religion, to the extent of considering them complementary in many aspects of their respective Weltanschauung, their conception of the universe, nature, society, life, and human beings. More specifically, it endeavors to justify those Christian beliefs are entirely compatible with the acceptance of current evolutionary theory. While we agree with the possibility of arguing for this extensive compatibility, as empirically demonstrated by the fact that practicing scientists of various religions produce good and abundant physical, biological, and various other sciences, we must also note our disagreement regarding the limits of such compatibility. This is especially true concerning supernatural causality in explaining nature, the acceptance of which, in our view, would invalidate its epistemic scope. Additionally, we express our disagreement regarding the discernment of the material object of attention of each, such that no proposal of strong compatibility should lose sight of the fact that ontological statements, subject to verification or falsification, belong to scientific activity. Meanwhile, statements of moral and existential content, in the context where truth criteria in the epistemic sense are subsidiary, belong to religion. Moreover, we generally find a lack of clarity or deliberate calculated ambiguity in Ruse's discourse when presenting Christian beliefs in his work. Despite his explicit confession of atheism, the way in which these beliefs are presented makes it very difficult to interpret them as not being personally endorsed.

Additionally, Ruse approaches the Philosophy of Science, as mentioned, from the perspective of the Philosophy of Biology. We welcome this perspective, considering it beneficial for biology and its development. If the science Plato (circa 427 BCE-347 BCE) had in mind as an archetypal model when philosophizing about epistemology is undoubtedly a formal science—recall the inscription "Let no one ignorant of geometry enter" on the frontispiece of the Academy—and in the allegory of the cave, he gives crucial importance to mathematics, then, since the inherited conception in the tradition of the Philosophy of Science in the last century, it could be said without exaggeration that physics has been mostly assumed as the model to investigate what science consists of. For example, the legal coverage model of Hempel-Oppenheim, cited above, has been predominantly applied in physics and chemistry, and key authors in the analysis of science models have been primarily trained in these disciplines. This leads us to consider the need to investigate the science model from and for biology. It is also essential to define and establish the model specifically suitable for biological science, given that, in areas like physics and chemistry, the recourse to scientific laws for explanatory purposes is common, whereas in biology, models are often used as explanatory tools. Taking into account the diversity of scientific areas, we emphasize the differences between types of scientific explanation based on legal coverage as an indispensable element, along with other relevant aspects, and types of scientific explanation based on models as explanatory tools. This distinction becomes particularly important in evolutionary biology, where the direct and effective application of laws, as understood in logic, mathematics, or physics, to study the material object of the discipline is typically scarce, if not even questionable. We also argue that the distinction between epistemic-cultural values, for the reasons mentioned earlier, would be more precise if replaced by intraepistemic and extraepistemic values, and the debate about their relevance and hierarchy as conceptual elements of scientific explanation, when it comes to Darwinism and evolutionary theory in general, should always consider the specificities of evolutionary biology as a field of knowledge to develop an appropriately unique explanatory model.

Furthermore, we share Ruse's anthropological optimism, particularly when he engages in understanding human beings in nature mainly from the perspective of evolutionary theory, temporarily setting aside the implications arising from Christian beliefs, whether or not they are assumed in his texts as personal convictions. This anthropological optimism is also evident in the treatment of human and non-human animal behavior, where we appreciate Ruse's analogy based on Daniel Dennett's thesis

regarding the dialectic between genetic determinism and freedom. According to this analogy, quasi-deterministic sociobiological explanations may be more or less fitting for species like hymenopterans (ants, wasps, bees, bumblebees, etc.) —the "hard line of genetic determination"— as they can be mass-produced like evolutionarily cheap missiles, lack behavioural self-regulation mechanisms, and are biologically effective as long as their genetically "programmed" goal for a univocal response is not altered. In contrast, Homo sapiens would resemble an evolutionarily expensive missile due to the prolonged and high production cost involved in its upbringing and socialization. Additionally, it integrates moral and social self-regulating mechanisms into its behaviour, which can divert it from the stimulus-response behavioural device. As a result, the biological projectile's goal becomes an open-ended future with multivalent responses, despite the causal influence of deterministic laws that may affect it. This qualitative difference in behavioural response to the environment, in our opinion, is based on the replacement of instinct by emotions. Emotions lack the automatism and immediacy characteristic of instinctive responses, allowing room for prior mediation of experience, reflection, and judgment. This establishes a flexible and open psychic system of behavioural springs much more sophisticated and richer than instincts. In line with Frans de Waal's investigation into the role of the human emotional system in evolution, we understand that emotions explain the difference in evolutionary cost between cheap and expensive missiles, between species like ants or wasps and Homo sapiens. In our view, emotions evolved because they decisively contribute to guiding human behaviour in environments too complex to be fully cognitively grasped. More concretely, emotions evolved "for their ability to induce adaptive reactions" (De Waal, 2019, p. 35).

Apart from these minor suggestions, there is hardly any additional disagreement on the aspects of his philosophy discussed earlier. In almost everything else, hats off to him.

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